



Space News Roundup

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Shuttle's sonic booms teach quake scientists a lesson

The double sonic booms emitted as *Columbia* decelerated on its return to Earth from STS-28 in August may have opened the eyes as well as the ears of many in the Los Angeles area.

By studying the seismic waves created as the sonic booms echoed simultaneously against about 400 downtown skyscrapers, scientists were surprised to see the ground-shaking waves amplified by the soft sediments underlying the city. As a result, researchers from the California Institute of Technology (CalTech) and the U.S. Geological Survey say the shockwaves from an earthquake in the area will sway Los Angeles'

skyscrapers more than previously thought.

The scientists presented their results Monday at the fall meeting of the American Geophysical Union in San Francisco.

The conclusion was drawn from the recordings of a seismometer based in Pasadena, Calif., that recorded a pulse from the southwest 12.5 seconds before the boom was heard.

"We looked at a map and realized that downtown Los Angeles is about nine miles southwest of Pasadena," said scientist Hiroo Kanamori, an author of the study. "We believe the sonic boom pushed almost simultane-

ously against the 400 high-rise buildings in downtown Los Angeles. The high-rises, in turn, pushed against the relatively soft sediment of the L.A. basin, and it's this ground motion we recorded. It appears 12.5 seconds before the sonic boom in our record because pressure waves travel faster through ground than through air."

Using their information, the researchers found that the underlying soft sediment of Los Angeles transmits pressure waves with two-to-three second periods. This resonance matches that of 20- to 30-story buildings. The combination means that, in addition to the soft

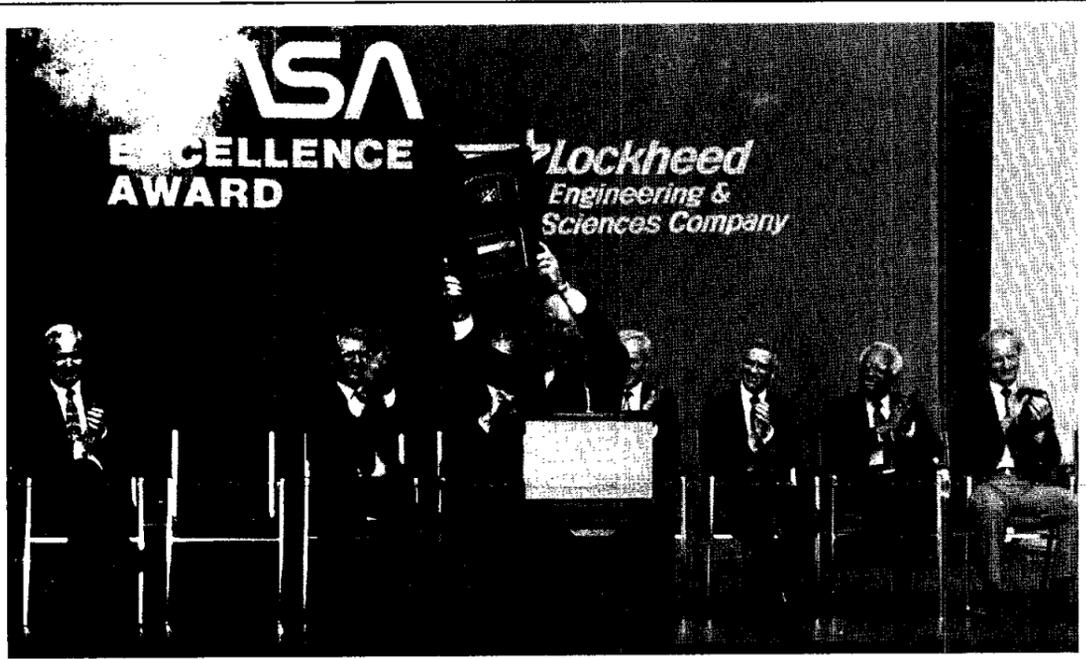
sediment's amplification of the shockwaves, buildings in that size range may experience greater shaking effects.

Still, there is no cause for alarm, explained James Beck, associate professor of engineering at CalTech. "It's not a Mexico City situation, where the Sept. 19, 1985, quake caused so much destruction. This happened primarily because the sediments of the dry lake bed on which Mexico City sits amplified ground motion by a factor of more than 10 for seismic waves with periods around two seconds," Beck said. "That situation isn't operating to anywhere near the same extent

in the Los Angeles basin, but we need to develop detailed computer models of the basin to determine what exactly the amplification would be."

The twin sonic booms emitted by *Columbia* are typical of shuttle landings. The orbiter emits two booms, one generated from the nose and another from the tail.

Whenever a shuttle lands, the shock waves are recorded by seismographic stations near the region of the sonic boom, and the ground motion registers distinctly different from that of an earthquake. However, a trajectory that places the sonic booms over Los Angeles is fairly rare.



JSC Photo by Sheri Dunnette

EXCELLENCE EXCITEMENT—Robert Young, president of Lockheed Engineering and Sciences Co., proudly displays the NASA Excellence Award earned by the JSC contractor. NASA Administrator Richard H. Truly presented the award to Young on Tuesday in ceremonies at the Gilruth Recreation Center. Thousands of Lockheed employees witnessed the ceremony featuring NASA and Lockheed dignitaries.

Columbia, crew get thumbs up for Christmas

By Kyle Herring

STS-32, which may be the first American space mission since Skylab 4 to span the Christmas holiday season, has been set for launch at 6:29 p.m. CST Dec. 18.

The Space Shuttle *Columbia* is in final preparations for its second flight this year, which will deploy a Navy communications satellite and retrieve the Long Duration Exposure Facility (LDEF).

Poised atop its mobile launch platform, *Columbia* made its way to launch pad 39A at Kennedy Space Center last week. Shuttle managers Tuesday gave the go-ahead to proceed toward the planned evening launch on schedule as it was manifested in June.

The launch window will open at approximately 6:29 p.m. and last for approximately 62 minutes. The exact launch window will be based on the latest tracking data for LDEF.

Several firsts are in store for this mission. The 10-day STS-32 flight will be the first launched from pad 39A since *Columbia* flew the STS-61C mission in January 1986. Since that flight, pad 39A has undergone the same modifications as pad 39B to improve emergency crew egress,

orbiter protection, communications, environmental control on the payload change out room and protection against freezing of water services.

There were 138 modifications to the pad, costing about \$50 million.

This will also be the first shuttle launch from Mobile Launch Platform 3 (MLP-3), which was last used during the Apollo program.

Though there have been two spaceflights during Christmas (Apollo 8 in 1968 and Skylab 4 in 1973), this would

be the first space shuttle flight during the holiday.

Another first is conducting back-to-back evening Shuttle launches. *Discovery* was launched on mission STS-33 at 6:23 p.m. CST Nov. 23.

In addition, as a 10-day flight, it is the first of a series of missions designed to extend the mission duration capability of the orbiter.

Work to prepare *Columbia* for the 33rd shuttle mission continues to go smoothly as the terminal countdown demonstration test with the crew was completed with no problems.

This week the helium signature leak checks were completed and the main engine frequency response test

Please see **COLUMBIA**, Page 4



Planning begins next week

JSC to be major summit venue

JSC will be a major venue for President Bush's Economic Summit to be held in Houston July 9-11, 1990.

Some 1,500 delegates from seven participating nations and more than 4,500 news media representatives from around the world are expected to converge upon Houston for the summit. JSC officials expect to begin

meeting with the White House planning team next week.

"This is a tremendous opportunity," said JSC Public Affairs Director Harold S. Stall. "The entire entourage is expected to pay a visit to the Johnson Space Center on the final day of the summit," he said.

"The details of that visit are yet to

be determined. It will be an unfolding story as the planning effort goes forward."

Stall said all of the major international players in the Space Station *Freedom* Program will have representatives at the summit, and therefore JSC will be a natural point of interest.

Venerable Skylab trainer moving

Bldg. 5 being prepared for space station simulators

By Linda Copley

Moving preparations are under way for one of JSC's most public exhibits, the venerable Skylab trainer that has played host to inquisitive school children and other wide-eyed visitors 364 days a year since 1973.

The combined skills of the Public Affairs Office's Public Services Branch and almost the entire Center Operations Directorate are being used to ensure the historical integrity of the valuable piece of hardware during this month's move from Bldg. 5.

The 107-by-22-foot trainer began its 18-month sabbatical from public view Nov. 15. Built from the third stage of a Saturn V rocket originally meant to take men to the Moon, the trainer will be temporarily stored in a new staging facility.

The move was necessitated by a major expansion scheduled to begin in Bldg. 5 after the first of the year. The high bay area that currently houses Skylab will be reconfigured, beginning Feb. 1, as the primary location for the space station simulators. The expansion will add 25,000 square feet of offices and technical areas to

Bldg. 5.

Skylab's new temporary home, Bldg. 413, is at the northwest end of JSC. The site was selected by the Facilities Development Division to house the trainer until Space Center Houston, the new JSC visitor center, is ready to once again put the world's first space station on display.

"This move is relatively big and is involving virtually every entity in the Center Operations Directorate," said Keith McQuary, Plant Engineering Division chief.

The Logistics Division is taking care of furnishing the riggers, the trucks and the huge crane needed to move the three-piece structure and accompanying display articles, McQuary explained.

Charles Lauritzen's Architectural-Civil Office in the Facility Development Division designed a circular spreader beam—made out of quarter-inch-walled steel tubing and capable of lifting up to 28,000 pounds—that will assist the crane in moving the enormous orbital workshop trainer (OWS) onto a flatbed truck.

Please see **SKYLAB**, Page 4



JSC Photo by Jack Jacob

Mechanical engineering technicians (from left) James Yost, David Kroen and James Davis helped build the spider-shaped spread bar apparatus that will help to move Skylab equipment to temporary storage quarters in Bldg. 413.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays.

General Cinema (valid for one year): \$3.75 each.

AMC Theater (valid until May 1990): \$3 each.

Sea World (San Antonio, year long): adults, \$17.25; children \$14.75. Christmas special: (Dec. 16-Jan. 1, includes snow ski jump and acrobatics and children's snowy play area): \$11.

Children's Christmas Party (Dec. 16, 10 a.m.-noon, Gilruth Recreation Center, includes photo with Santa, magician, clown, refreshments): children, \$4; adults, \$1.

Powderhorn Ski Trip (Jan. 23-27) 12 seats still available: \$385 each (four to a condo); \$339 each (six to a condo).

Holiday in the Park (at Astroworld): Pick up a coupon at Bldg. 11 for admission to a winter wonderland: \$5.95 each.

20th Anniversary of the First Lunar Landing Speakers Program, and The Moon As Seen By Apollo Astronauts videos are available in the Bldg. 11 Exchange Store, \$20 each.

JSC

Gilruth Center News

Sign up policy—All classes and athletic activities are first come, first served. To enroll, you must sign up in person at the Gilruth Recreation Center. Everyone will be required to show a badge or EAA membership card. Payment must be made in full at the time of registration. Classes tend to fill up four weeks in advance. For more information, call x35789 or x30304.

EAA badges—Dependents and spouses may apply for a photo I.D. 6:30-9:30 p.m. Monday-Friday.

Defensive driving—Course is offered from 8 a.m.-5 p.m., Dec. 16 and Jan 20; cost is \$15.

Weight safety—Required for use of the Rec Center weight room. Classes will be 8-9:30 p.m. Dec. 13; cost is \$4.

Low-impact aerobics and exercise—Each eight-week session runs twice a week from 5:15-6:15 p.m. Cost is \$24.

Fall Intercenter Run T-shirts—Please present I.D. at room 146 when picking up your shirt.

Basketball sign-ups—Basketball sign-ups will be Dec. 12-21 at the Gilruth Recreation Center. NASA-badged teams will sign up at 7 a.m. Dec. 19-20. Non-badged teams will sign up at 4:30 p.m. Dec. 21.

Volleyball sign-ups—Volleyball sign-ups will be Dec. 18.

JSC

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property

Sale: 60 acres, 3 mi. from Karnes City, TX, on Hwy 80; El Campo, TX, lg 2-story house, 1.5 lots, fruit trees. 783-9164.

Sale: Lake Texana area, 966 acres, brick, 4-2.5-3, metal shop, 50' x 110', 150 pecan trees, 100 mi. SW of Houston. (512) 771-3893.

Lease: Webster, El Dorado Trace, lg 2-2.5 townhome, FPL, W/D, ceiling fan, \$650/mo. + dep., no pets. Joe x30255 or 480-5470.

Sale: League City, 2.06 acres, near schools, \$35,000. 554-6695.

Sale: Shoreacres, 4-2-2, 1800 sq.ft., new paint and carpet, lg wooded lot, \$65,000. Sally, x37485 or 488-5501.

Rent: Countryside I, 3-2.5-2, 2-story, corner lot, brick/siding, 2.5 BA, fans, FP, new carpet, frig, W/D, \$695/mo. 283-5332 or 991-7439.

Sale: 14 x 70 mobile home, 2-2, neat, curtains and miniblinds, \$16,000. 534-4770.

Sale: Clear Creek Forest Subdiv., 2-acre resi. lot, wooded, power, \$8K. Laura, x31903 or 474-7072.

Trade: Custom canyon view 4-3 off 360 West of Austin, prefer 5 yr old, open plan w/20 min. of JSC. 471-88795 or 333-6083.

Lease: Webster/Ellington, 2-1 apt., many extras, W/D/ \$415/mo. Dave, x38156 or Eric, x38420.

Sale: Taylor Lake Estates, 90' x 135' lots, \$34,500 and \$36,500. Don, x38039 or 333-3313.

Rent: Mobile home lot, Hwy 3, Dickinson, 5 mi. from NASA Rd. 1, \$90/mo. 332-0365.

Lease: Pebblebrook condo, El Lago, 1-1, mirrored walls, miniblinds/verticals, W/D, upstairs unit, 650 sq ft, \$330/mo. Lindemann, 488-3300 or 532-2218.

Rent: Bacliff mobile home lot, \$85/mo., \$50 dep. 488-1758.

Rent: Lake Travis cabin, boat dock, A/CH, fully equipped, accom. 8, wkly/daily rates, \$325/\$75. 326-5652.

Rent: Lake Livingston, waterfront, 3-2, A/CH, FP, covered deck, pier, new cond., furn., wknd or wk. 482-1582.

Cars & Trucks

'75 Porsche 911S, 5 spd., A/C, 16" w/Michelins, new int., tinted wdw., \$14,500, OBO. 445-4037.

'83 Chevy Scottsdale PU, PB, PS, A/C, R, camper. ex. cond., 74K mi., \$3500. 980-7479.

'71 Datsun 240Z, new clutch, fuel pump, air struts, triple Weber carbs, \$1500. 282-3479 or 532-1112.

'79 Lincoln Cont. Town Coupe, 75K mi., \$1995. Faye, x39084 or 488-05481.

'55 Chevy 2-dr sedan, 350 turbo trans., no motor, many orig. pts. 335-1250.

'83 lt. blue Nissan Sentra/2-dr, 5-spd, AM/FM cass, 76K mi., ex. cond. James, 480-3381.

'82 Layton 23' travel trlr, ex. cond., sleeps 4+, lg. awning, wt. dist., hitch, full bath. 554-2929.

'81 Datsun 280ZX, clean, good mech. cond., new tires, new clutch, reb. 5-spd trans., stereo w/eq., red, \$3300. x35005 or 474-2906.

'73 Datsun 240Z, blue, 91K mi., \$1500, OBO. Mike, x32808 or 532-1051.

'87 Trans Am blue w/gray trim and int, fully loaded, I-tops, tinted wds and Alpine sec. system., 27K mi., ex. cond., \$13,000. 532-3507.

'84 Bonneville Brougham, ex. cond., auto. trans., cruise, wire wheels, tilt, stereo/cass., PL, A/C, recent eng. overhaul, \$4600. 474-2384.

'86 Celica GT-S, mint cond., A/C, cruise, stereo/cass, pwr pkg, 39K mi., \$9550. 474-2384.

'86 Toyota PU, auto. w/OD, A/C, AM/FM/cass., tinted wds., tool box, ex. cond., \$5800. Debbie, x32292 or 996-0373.

'84 Honda Civic 4-dr sedan, auto., A/C, AM/FM/cass., tinted wds. ex. cond., \$4800. Vic, 334-2335 or 282-3216.

'85 Chevy Nova, 4-dr, auto., A/C, P/S, P/B, 40K mi., AM/FM/cass., red, \$4000. 997-1374.

'85 Cadillac Fleetwood, FWD, 25 mpg, 64K mi., like new, \$9500, OBO. Tom, x38298 or 488-4089.

'72 Lotus Europa twin cam special, Pirelli P-7, Weber head, air, great body and int, eng. needs some work, \$6500. 333-8707 or 480-5425.

'85 Toyota MR2, loaded, 63K mi., gar. kept, \$5750. 538-1479.

'72 Fiat Spyder convert, blue, ex. cond., stereo, reb. eng., new brakes. 488-2941.

'83 Ford Bronco XLT, 4WD, 51K mi., super cond. 282-5325.

'84 Chevy Celebrity, 4-dr, auto. trans., A/C, P/W, P/L, cruise, tilt, deluxe uphol., recl. bkt seats, AM/FM radio w/cass., metallic brown, \$3300. Edward, x36250 or 481-4889.

'81 Mazda RX7 GSL, loaded, very clean, new tires, \$4250. John, x38178 or 482-5837.

'77 Mazda GLC, reb. eng. '82, A/C, AM/FM eqz., good cond., 5-spd, \$750, OBO. Mara, x38608 or (409) 737-4266.

'77 Toyota Corolla, A/C, good stereo, \$600, OBO. Fred, x30770 or 480-6951.

Cycles

'85 Suzuki Madura, under warr., \$2799 or \$700 and assume next 30 mo. 538-1479.

'75 Honda CB750, blue, 13K mi., \$450. Mike, x38169 or 482-8496.

Boats & Planes

'87 AMF TRAC 16' Cat. sail boat, ex. cond., \$2000. 332-7908.

Bass Fishing rig, 15' Tidecraft w/trlr., 50 hp Merc., Super Motorguide trolling motor, rigged w/dry stor., carpet, front seat steering, \$1200, OBO. 488-4453.

Atari 400 w/tape recorder, chess cartridge and Space Invaders, \$35. 488-9257 or 488-4828.

EVEREX 1200 baud int. modem, set to COM1-COM4, manuals, software, perfect cond., \$30. 487-3799.

IBM PC software, "VP-EXPERT", 2.1, new, \$65. 487-3799.

IBM compat. 640 RAM, 20K HD, color mouse, printer, relational DB, software, \$1500, OBO. Bob, 339-1563 or Cotton, 339-2949.

EPSON-FX wide-carriage printer, \$250, OBO; lg desk, all wood, w/shelves for comp. and/or access., \$325. Clifford, x37019 or 480-5499.

22MB Rodine 202E FH HD in ext. case w/pwr supply; WD1002S-WX2 controlled w/cables, \$225. White, x30621.

New FH Tandon TM100-2 360K floppy drive, \$80. White, x30621.

Realistic car stereo equal., 40 watt, \$20; pr.

JSC

Dates & Data

Today

Christmas dance—A JSC/EAA Christmas Dance will be held from 7 p.m.-1 a.m. Dec. 8 at the Gilruth Recreation Center. Cost is \$15 per person; includes roast beef dinner.

Cafeteria menu—Special: tuna and noodle casserole. Entrees: broiled codfish, fried shrimp, baked ham. Soup: seafood gumbo. Vegetables: corn, turnip greens, stewed tomatoes.

Saturday

Christmas dance—A JSC/EAA Christmas Dance will be held from 7 p.m.-1 a.m. Dec. 9 at the Gilruth Recreation Center. Cost is \$20 per person; includes prime rib dinner.

Monday

CLAUG to meet—The Clear Lake Apple Users Group (CLAUG) will meet at 7 p.m. Dec. 11 in the Clear Lake Park Bldg., 5001 NASA Rd. 1. For more information, call Larry Walker at x35591 or 488-1135.

Cafeteria menu—Special: meatballs and spaghetti. Entrees: wieners and beans, round steak with hash browns. Soup: chicken noodle. Vegetables: okra and tomatoes, carrots, whipped potatoes.

Tuesday

Cafeteria menu—Special: fried chicken. Entrees: beef stew, shrimp creole, sweet and sour pork chop with fried rice. Soup: beef and barley. Vegetables: stewed tomatoes, mixed vegetables, broccoli.

Wednesday

Threshold Group Meeting—A coordinating committee meeting will be held from 4-5 p.m. Dec. 13 in Bldg. 45, Room 203. For information, contact James Sturm, x33085.

Cafeteria menu—Special: Swiss steak. Entrees: fried perch, New England dinner. Soup: seafood gumbo. Vegetables: Italian green beans, cabbage, carrots.

Thursday

AIAA director's reception—The American Institute of Aeronautics and Astronautics (AIAA) will host the annual JSC Director's Reception beginning at 5:30 p.m. Dec. 14 at the Gilruth Recreation Center. The roast beef dinner will be served at 6:30; the program, featuring JSC Director Aaron Cohen as speaker, begins at 7:30. Tickets are \$9 for members, \$10 for non-members, and \$8 for students; tickets are not required to attend the program only. Dinner reservations must be made by noon Dec. 11 by calling Sarah Leggio at 282-3160.

CLPA to meet—The Clear Lake Personnel Association will feature a lunch and panel discussion on "The Employer's Responsibility in the War on Drugs," at 11:30 a.m. Dec. 14 at the American Host Hotel. Call Shirley Jensen, 480-4101, for more information.

Cafeteria menu—Special: stuffed bell pepper. Entrees: turkey and dressing, enchiladas with chili, wieners and baked beans. Soup: cream

of chicken. Vegetables: zucchini squash, English peas, rice.

Dec. 15

The Moon: Gift to Humanity program—The Houston Space Society will present Dr. Wendell Mendell, chief project scientist for Space Station *Freedom*, speaking on using the Moon as a stepping stone for exploration and development of the rest of the Solar System at 7:30 p.m. on Dec. 15 in the Caribbean Room at The University of Houston. Call 639-4221 for more details.

Cafeteria menu—Special: Salisbury steak. Entrees: baked scrod, broiled chicken with peach half. Soup: seafood gumbo. Vegetables: cauliflower au gratin, mixed vegetables, buttered cabbage, whipped potatoes.

Dec. 25

Christmas holiday—Most JSC offices will be closed and the center will be closed to visitors in observance of the Christmas holiday. The Space News Roundup will not be published Dec. 29.

Dec. 26

BAPCO meeting—The Bay Area PC Organization will meet at 7:30 p.m. Dec. 26 at the League City Bank and Trust. Contact Earl Rubenstein at x34807 or 326-2354, or Ron Waldbillig at 337-5074 for information.

Jan. 1

New Year's Day—Most JSC offices will be closed in observance of the New Year's Day holiday.

Swap Shop

TS-87 spkrs, 3/4 in., \$10, Rick, 996-8961 or 280-1500 (x3323).

JVC KD-95 stereo cass. deck, 10 yrs. old, top-of-the-line, \$90; 7 x 9 wood veneer spkr. boxes (2), \$5. 482-2138.

Household

Cedar wood glider, seats 3 people, like new, \$60. x30180 or 480-5596.

Convection oven, \$80; Hamilton Beach food processor w/all parts, \$45; both in excellent working order, 486-1909.

Antique oak armoire and dresser, armoire has door w/beveled mirror, \$600 for both; antique Amer. pine bed w/new matt., never used, \$900. 996-1442.

Oriental style Basset BR set, queen/full hd. bd., 2 night stands, chest, dresser w/mirror, perf. cond., \$1000, OBO. x33233 or 480-5061.

5-pc early Amer. den furn., \$100; 5-pc dinette set, \$75. Joe, x30255 or 480-5470.

Solid oak BR wall w/chest of drawers, ex. cond., \$1300; full size swing set w/slide, good cond., \$40. x30789 or 280-9974.

Dining table, solid oak, butcher block, rect. 7' x 3', w/6 solid oak cane-bottomed chairs, BO. Patrick, x32635 or 488-1079.

G&S dishwasher, noisy and old but works, \$10. Jeff, 482-5393.

Sleeper sofa and loveseat, high-back, quail pattern, \$400. Matt, x34285 or 486-7260.

Oval dinette w/leaf and 4 chairs, padded on wheels, ex. cond., \$160; hex. glass table w/wood and 4 chairs, \$75. Barbara, 332-0094.

Solid wood table w/2 18-in. leaves; 48-in. octag. shape, ex. cond., \$100. 333-3254.

Double bed, extra firm, w/sheets, comforter, pillows, \$175, OBO. x38385.

Gold couch, ex. cond., \$125; tall boy Lazy Boy rocker recliner, brown, \$70. Gene, x33187 or 488-5162.

Sears Kenmore heavy duty W/D, good cond, 6 yrs old, \$150/pr. 480-9139.

G.E. built-in DB oven, ex. cond.; full-sz matt. and box springs. 488-2822.

Lighted, antique-look china closet, ex. cond., \$350. 283-5685 or 532-1026.

Desk chair, \$15; Hutch, solid teak w/glass doors, \$75. Ed, x36250.

Drop leaf table, \$150; dresser w/beveled mirror, \$145; desk, \$195; washstand, \$185; curio cabinet, \$125; lg wardrobe, \$119; dresser, \$129; stained glass, \$25. 283-5616 or 488-3595.

Lost & Found

Found watch in parking lot C-4, Mario Ramirez, x33428.

Photographic

Fujica AX-3; Fuji lenses, 50mm, 35-70mm w/macro, 135mm tele, 28mm wide angle, 300X strobe flash, auto winder, ex. cond., \$500. x33233 or 480-5061.

Nikkormat EL 35mm camera, Soligor 35-140mm f/3.5 auto zoom lens w/macro, Soligor MK-30A flash w/2 auto ranges and zoom, new camera bag, acces. Mike, x37777.

Pets & Livestock

Free, black, male, neut., 5-yr old cat, house broken, short hair. 481-6945.

Free kittens, born 9/13/89, 3 male, 1 female. 282-4307 or 649-0141.

Free, 2 fem. kittens. Pam, 675-1538.

AKC Whippet puppies, champion sired, shots, wormed, \$250. 649-6315 or 333-4173.

AKC Standard Poodle, spayed, black fem., 3-yr old, obedient, good w/children, \$100. 649-6315 or 332-4173.

Wanted

Want zoom lens w/wide-angle capability, either Canon lens or to fit Canon; roof rack for Maxima (to carry Mtn. Bikes); guitar amp. Clifford, x37019 or 480-5499.

Want riders for carpool from I-10/Hwy 6 Park-and-Ride to JSC/Clear Lake area, 7:30 a.m. to 4:00 p.m., x31810.

Want someone to re-upholster boat cushions. Don, x38039 or 333-3313.

Want Starwars spaceships, toys, figures and books. Ron, 482-1385.

Want Volvo 15" turbo wheel (5 spokes), good cond. Vincent, x30874 or 333-1316.

Want slide projector. Vincent, 335-7341 or 333-3577.

Want sheet music for piano, any age, any style. 334-4894.

Musical Instruments

Korg digital piano, DP-80, int. spkr, midi-compat, 76 keys, damper pedal, stand incl. jacks for ext. spkrs, headphones, was \$600, now \$300. x34039.

Miscellaneous

Antiques: lg wooden wheelchair, good cond; iron bed. 783-9164.

Sale: plane tickets, NW Airlines round trip, Houston Hobby to Buffalo, NY, departs Dec. 24, returns Dec. 29, \$100. x32242 or 480-1735.

17" Zenith color TV w/stand and cable converter, \$150; comp. golf outfit, clubs, irons, balls, bag, etc., \$200; liquor carrying case w/acces., \$25; Yamashita 35mm camera w/builtins, \$20; 11 qt cooler, \$10; Regal Poly Pot elec. slow cooker, \$20; 8-piece snack set, honey yellow. \$8; silver serving platters, \$10. 488-9790.

Water pump, reciprocating (piston), for water well, \$10. Bauch, 333-3382.

Wedding dress and matching veil, sz 8, candlelight, trad. style, \$200. Karen, 481-5853.

8-chord Bontempi elec. table organ, new, \$25; antenna rotator, model AR-40 w/elec. control box, \$50; Shure model 201 ceramic mike, hand held, \$10; other ham gear; Navy freq. meter, LM-21 w/power supply, \$20. 921-7212.

Snow skis, Atomic 180, w/Solomon bindings and poles, \$125. 482-7546.

Aquarium, 105 gal. freshwater, mirror back, complete setup, fish, plants, 2 magnum 330 pumps, stand, cover, lights, air pumps, BO. Patrick, x32635 or 488-1079.

Autumn haze mink cape, \$325; office desk, file cabinet, typing table, \$100; 10 gal. aquarium, \$15. 944-5624.

Western tan cowhide fringe coat sz 40, like new, \$79; electronic infinity mirror, \$40; Avon collector steins. Boyd, 488-8806.

Abdominal board, folds for carrying, \$25. x30180 or 480-5596

New space policy updates, reaffirms goals

Guides civil, commercial, national security sectors

(Editor's note: This is the final installment in a two-part collection of excerpts from President George Bush's revised national space policy.)

Civil Space Sector Guidelines (continued)

- **Space Exploration.** In order to investigate phenomena and objects both within and beyond the solar system, NASA will conduct a balanced program of manned and unmanned exploration.

- Human Exploration.** To implement the long-range goal of expanding human presence and activity beyond Earth orbit in to the solar system, NASA will continue the systematic development of technologies necessary to enable and support a range of future manned missions. This technology program (Pathfinder) will be oriented toward a Presidential decision on a focused program of manned exploration of the solar system.

- Unmanned Exploration.** NASA will continue to pursue a program of unmanned exploration where such exploration can most efficiently and effectively satisfy national space objectives by, among other things: achieving scientific objectives where human presence is undesirable or unnecessary; exploring realms where the risks or costs of life support are unacceptable; and providing data vital to support future manned missions.

- **Permanent Manned Presence.** NASA will develop the space station to achieve permanently manned operational capability by the mid-1990s. Space Station *Freedom* will: (1) contribute to U.S. preeminence in critical aspects of manned space flight; (2) provide support and stability to scientific and technological investigations; (3) provide early benefits, particularly in the materials and life sciences; (4) promote private sector experimentation preparatory to independent commercial activity; (5) allow evolution in keeping with the needs of station users and the long-term goals of the U.S.; (6) provide opportunities for commercial sector participation; and (7) contribute to the longer term goal of expanding human presence and activity beyond Earth orbit into the solar system.

- **Manned Spaceflight Preeminence.** Approved programs such as efforts to improve and safely operate the Space Transportation System (STS) and to develop, deploy, and use the space station, are intended to ensure U.S. preeminence in critical aspects of manned space flight.

- **Space Applications.** NASA and other agencies will pursue the identification and development of appropriate applications flowing from their activities. Agencies will seek to promote private sector development and implementation of applications.

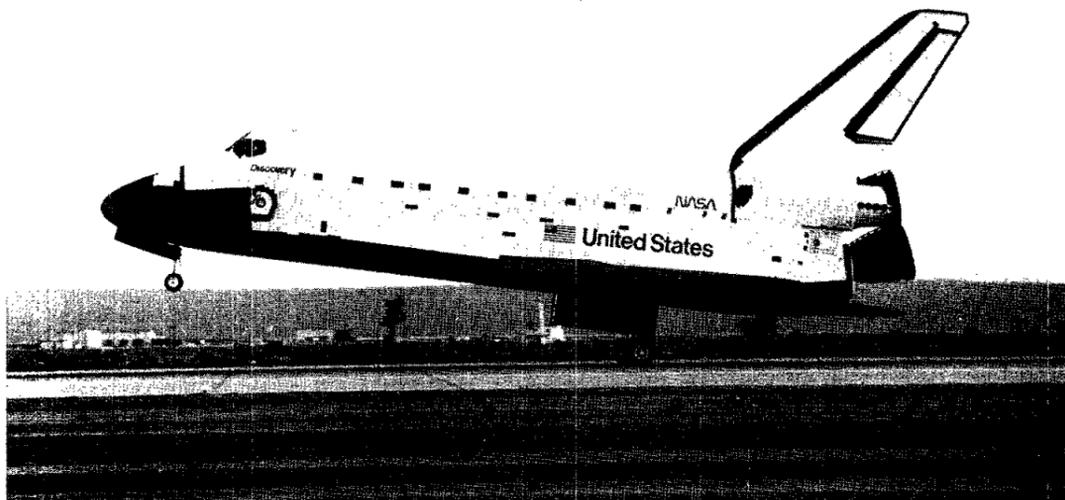
- Such applications will create new capabilities, or improve the quality or efficiency of continuing activities, including long-term scientific observations.

- NASA will seek to ensure its capability to conduct selected critical missions through an appropriate mix of assured access to space, on-orbit sparring, advanced automation techniques, redundancy, and other suitable measures.

- Agencies may enter cooperative research and development agreements on space applications with firms seeking to advance the relevant state-of-the-art consistent with U.S. Government space objectives

Management of Federal civil operational remote sensing is the responsibility of the Department of Commerce.

- **Civil Government Space Transportation.** The unique Space Transportation System (STS) capability to provide manned access to space will be exploited in those areas that offer the greatest national return, including contributing to U.S. preeminence in critical aspects of manned spaceflight. NASA will establish sustainable STS flight rates to provide for planning and budgeting of government space programs. NASA will pursue appropriate enhancements to STS operational capabilities, upper stages, and systems for deploying, servicing, and retrieving spacecraft as national and user requirements are defined.



The Space Shuttle *Discovery* returns from its dedicated Department of Defense (DOD) mission. The new national space policy instructs the DOD to assure the shuttle's utility to national defense.

- **International Cooperation.** The U.S. will foster increased international cooperation in civil space activities by seeking mutually beneficial international participation in civil space and space-related programs. The National Space Council shall be responsible for oversight of civil space cooperation with the Soviet Union.

- U.S. participation in international space ventures, whether public or private, must be consistent with U.S. technology transfer laws, regulations, Executive Orders and Presidential Directives.

Commercial Space Sector Guidelines

- NASA, and the Departments of Commerce, Defense, and Transportation will work cooperatively to develop and implement specific measures to foster the growth of private sector commercial use of space. A high-level focus for commercial space issues has been created through establishment of the National Space Council.

- To stimulate private sector investment, ownership, and operation of space assets, the U.S. government will facilitate private sector access to appropriate U.S. space-related hardware and facilities, and encourage the private sector to undertake commercial space ventures. Governmental Space Sectors shall:

- Utilize commercially available goods and services to the fullest extent feasible, and avoid actions that may preclude or deter commercial space sector activities except as required by national security or public safety.

- Enter into appropriate cooperative agreements to encourage and advance private sector basic research, development, and operations while protecting the commercial value of the intellectual property developed;

- Provide for the use of appropriate government facilities on a reimbursable basis;

- Identify, and eliminate or propose for elimination, applicable space sector activities;

- Provide for the timely transfer of government-developed space technology to the private sector in such a manner as to protect its commercial value, consistent with national security.

National Security Space Sector Guidelines

- The Department of Defense (DOD) will develop, operate, and maintain an assured mission capability through an appropriate mix of robust satellite control, assured access to space, on-orbit sparring, proliferation, reconstruction or other means.

- The national security space program, including dissemination of data, shall be conducted in accordance with Executive Orders and applicable directives for the protection of national security information and commensurate with both the missions performed and the security measures necessary to protect related space activities.

- DOD will ensure that the national security space program incorporates the support requirements of the Strategic Defense Initiative.

Inter-Sector Guidelines

- **Space Transportation Guidelines**

- The U.S. national space transportation capability will be based on a mix of vehicles, consisting of the Space Transportation System (STS), unmanned launch vehicles (ULVs), and in-space transportation systems.

- As determined by specific mission requirements, national security space sector will use the STS and ULVs. In coordination with NASA, the DOD will assure the shuttle's utility to national defense and will integrate missions into the shuttle system. Launches necessary to preserve and protect human life in space shall have the highest priority except in times of national security emergency.

- The STS will continue to be managed and operated in an institutional arrangement consistent with the current NASA/DOD Memorandum of Understanding. Responsibility will remain in NASA for operational control of the STS for civil missions, and in the DOD for operational control of the STS for national security missions. Mission management is the responsibility of the mission agency.

- U.S. commercial launch operations are an integral element of a robust national space launch capability. NASA will not maintain an expendable launch vehicle (ELV) adjunct to the STS. NASA will provide launch services for commercial and foreign payloads only where those payloads must be man-tended, require the unique capabilities of the STS, or it is determined that launching the payloads on the STS is important for national security or foreign policy purposes.

- Civil government agencies will encourage, to the maximum extent feasible, a domestic commercial launch industry by contracting for necessary ELV launch services directly from the private sector or with DOD.

- NASA and the DOD will continue to cooperate in the development and use of military and civil space transportation systems and avoid unnecessary duplication of activities.

- **Guidelines for the Federal Encouragement of Commercial Unmanned Launch Vehicles (ULVs):**

- The U.S. government fully endorses and will facilitate the commercialization of U.S. ULVs. The DOT is the lead agency within the Federal government for developing, coordinating, and articulating Federal policy and regulatory guidance pertaining to U.S. commercial launch activities in consultation with DOD, State, NASA, and other concerned agencies. All executive departments and agencies shall assist the DOT in carrying out its responsibilities.

- The U.S. government encourages the use of its launch and launch-related facilities for U.S. commercial launch operations.

- The U.S. government will have priority use of government facilities and support services to meet national security and critical mission requirements.

- The U.S. government will not subsidize the commercialization of ULVs, but will price the use of its facilities, equipment, and services with the goal of encouraging viable commercial ULV activities in accordance with the Commercial Space Launch Act.

- The U.S. government will encourage free market competition with the U.S. private sector.

- NASA and DOD, for those unclassified and releasable capabilities for which they have responsibility, shall, to the maximum extent feasible:

- Use best efforts to provide commercial launch firms with access, on a reimbursable basis, to national launch and launch-related facilities, equipment, tooling, and services to support commercial launch operations.

- **Commercial Launch Firm Requirements.** Commercial Launch firms shall:

- Maintain all facilities and equipment leased from the U.S. government to a level of readiness and repair specified by the U.S. government;

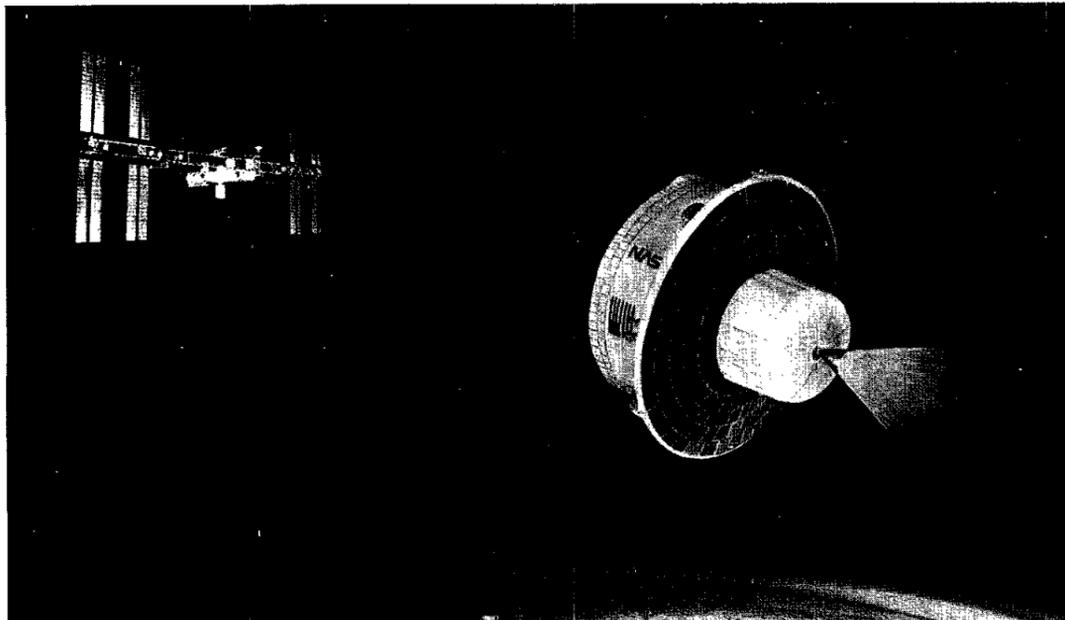
- ULV operators shall comply with all requirements of the Commercial Space Launch Act, all regulations issued under the Act, and all terms, conditions or restrictions of any license issued or transferred by the Secretary of Transportation under the Act.

- **Technology Transfer Guidelines.**

- The U.S. will work to stem the flow of advanced western space technology to unauthorized destinations. Executive departments and agencies will be fully responsible for protecting against adverse technology transfer in the conduct of their programs.

- Sales of U.S. space hardware, software, and related technologies for use in foreign space projects will be consistent with relevant international and bilateral agreements and arrangements.

- **Space Infrastructure.** All sectors shall recognize the importance of appropriate investments in the facilities and human resources necessary to support U.S. space objectives and maintain investments that are consistent with such objectives. The National Space Council will conduct a feasibility study of alternate methods for encouraging private sector investment, including capital funding, of U.S. space infrastructure such as ground facilities, launcher developments, and orbital assembly and test facilities.



In this artist's concept, a proposed Assured Crew Return Vehicle prepares to reenter Earth's atmosphere after leaving Space Station *Freedom*. The new policy reemphasizes the need for a permanently manned space station.

Fields hangs STS-33 plaque for team

John Fields, the flight design manager for STS-33, earned the right to hang the mission plaque on behalf of the propulsion, flight dynamics and flight design team at Mission Control Center ceremonies immediately following the Nov. 28 landing.

"There was a lot of unique work done in support of STS-33," said Lead Flight Director Chuck Shaw. "It all started two years ago with a lot of combined work by the propulsion console and flight dynamics console and the flight design team."

Shaw said he presented the STS-33 mission plaque to Ed Gonzalez,

the lead flight dynamics officer for the flight, who in turn gave it to Fields as the person who had contributed

JSC

People

the most to the team effort. Fields then hung the plaque on behalf of the team.

Three secretaries earn honors

Three JSC secretaries—Judy V.

Janner, Lisa C. Scully and Brenda P. Whitley—have received the Marilyn J. Bocking Secretarial Excellence Award in recent months.

Janner, who serves as lead secretary for the Project Engineering Branch within the Mission Operations Directorate's Facility and Support Systems Division, was recognized for her willingness to go above and beyond her normal duties in contributing to directorate, division and branch products of the highest quality.

Scully is secretary to the deputy manager of the Systems Engineering



Fields



Janner



Scully



Whitley

Office in the National Space Transportation System Program Office. She was cited as a key element in coping with the rapid growth of the office since its inception almost three years ago, and for accomplishing tasks that were clearly above her job description.

Whitley assists the supervisor of

the Operations Integration Office within the Space Station Projects Office. She was cited for being an "outstanding" secretary to the manager of the office, contributing to the first combined project and operations organization.

Each recipient received a plaque and a cash award.



JSC Photo

BENCH CHECK—Four members of the STS-32 crew—Pilot Jim Wetherbee, Commander Dan Brandenstein and Mission Specialists David Low and Bonnie Dunbar—inspect on-board equipment for the mission at a recent bench review.

Solar Max reenters after extended life

NASA's Solar Max—the first satellite to be repaired while in orbit—reentered the Earth's atmosphere over the Indian Ocean on Saturday.

The Sun-monitoring satellite, formally titled Solar Maximum Mission, received a five-year life extension after shuttle Astronauts George "Pinky" Nelson and James "Ox" Van Hoften repaired it in April 1984 during STS-41C.

Officials at Goddard Space Flight Center, where Solar Max was controlled, said trackers reported the satellite reentered just west of Indonesia about 4:26 a.m. CST Saturday. There were no immediate reports of debris falling on land and no plans to attempt recovery of any debris.

The 5,000-pound satellite was launched on an unmanned rocket in February 1980 to study changes in the solar cycle. Soon after it was launched, several of its instruments failed and the repair rendezvous by *Challenger* and her crew was initiated.

Although 1984 repairs to Solar Max went even smoother than expected, the rendezvous and grappling called for some dramatic improvisation. The original mission plan called for Commander Bob Crippen to rendezvous *Challenger* with Solar Max, and for Nelson to fly out in a manned maneuvering unit (MMU), dock with it and return it to the payload bay for repairs.

But Nelson was unable to snare the satellite. Three times he tried, and three times he bounced away because of a problem with the trunion pin attachment system.

Before returning to *Challenger*, Nelson grabbed one of Solar Max's solar panels in an attempt to dampen its motion. At first, it appeared to work, but after four unsuccessful robot arm grappling attempts, Goddard controllers had to send some innovative commands that bypassed Solar Max's gyros and successfully stilled the satellite.

Fighting shortages of maneuvering fuel, Crippen again maneuvered *Challenger* within grappling range and Mission Specialist Terry Hart successfully grabbed the satellite with the remote manipulator system. The repairs could begin.

United Press International described the rendezvous and repair as "America's boldest adventure in space since men last walked on the Moon in 1972." It was an adventure that allowed Solar Max to accumulate much important data about the Sun and its cycles, to detect one of the largest solar flare eruptions ever seen, and to detect Supernova 1987a.

Mars Observer launch contract awarded

NASA has awarded a \$156 million contract to Martin Marietta Corp. to provide launch services for the Mars Observer spacecraft utilizing a Titan III.

Work under the firm-fixed-price contract is being performed at Martin Marietta's Denver plant and at the Eastern Space and Missile Center in Florida.

The contract reflects NASA's commitment to the emerging domestic

commercial launch service industry in this country.

"NASA is purchasing launch services much the same way as a commercial customer would do," said John Gibb, chief of the Launch Vehicle Project Office at Lewis Research Center, which is managing the contract.

Scheduled for launch in September 1992, the Mars Observer is an orbital

platform that will make a global study of the geochemistry, atmosphere dynamics, atmospheric/surface interactions, seasonal variations and magnetic field characteristics of the planet Mars over a full martian year (two Earth years). While much is known about Mars, scientific data from the orbiter will provide an improved basis for future intensive investigations and manned exploration.

Columbia nearly ready for Dec. 18 launch

(Continued from Page 1)

test concluded Wednesday morning. Tuesday, the payload bay doors were closed for flight and flow checks of the reaction control system regulators were to have been completed yesterday.

Two contingency extravehicular mobility units are to be installed and checked out in *Columbia's* airlock

today.

At the pad, workers are cycling the liquid oxygen farm pumps, and validating the gaseous oxygen vent arm.

With launch scheduled for Dec. 18, the countdown would begin 3 p.m. CST, Dec. 15 at the T-minus-43-hour mark.

The STS-32 crew commanded by

Dan Brandenstein is scheduled to undergo final simulation training here before travelling to the launch site Dec. 15 for final briefings and Shuttle Training Aircraft practice flights from the Shuttle Landing Facility.

Joining Brandenstein are Pilot Jim Wetherbee and Mission Specialists Bonnie Dunbar, Marsha Ivins and David Low.



JSC Photo by Jack Jacob

FOND FAREWELL—Longtime JSC manager Arnold Aldrich, NASA associate administrator for Aeronautics and Space Technology, smiles as NASA Administrator Richard H. Truly presents him with a plaque Tuesday at Webster Civic Center. About 300 friends were on hand to commemorate his nearly 30 years at JSC.

Space News Roundup

The **Roundup** is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every Friday by the Public Affairs Office for all space center employees.

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Editor Kelly Humphries
Associate Editor . . . Linda Copley

Skylab trainer being prepared for temporary move

(Continued from Page 1)

Once designed, the spreader beam lifting fixture was fabricated in the Bldg. 10 shop by J.D. Williams' Technical Services Division, and the entire move effort was orchestrated by the Plant Engineering area.

Prior to the move, Bob Luke of JSC's exhibits contractor, Omniplan Corp., coordinated the removal of all the exhibit ramps, structures and signs surrounding the trainer and the documentation and removal of all the loose articles inside. Omniplan designed new visitor traffic signs to direct people away from Bldg. 5, and the Management Services Division produced the signs.

Public Affairs Specialist Boyd Mounce designed a new brochure that deletes Bldg. 5 as a public viewing

location. The brochure was printed by Management Services' Printing Management Branch.

"The Photography and Television Technology Division is busy recording the exact placement of every part of the display before it is moved, for use later in reassembly. The Security Division will be involved in blocking and redirecting center traffic during the move," McQuary explained.

Skylab's new quarters will be a 50-by-100-foot building with a 30-foot high eave. Because of the trainer's size, the north end of the building will be removable.

"We have to plan this move so that all the pieces of Skylab are stored inside, before we put the north wall on the building," McQuary said. "That means the entire move has to take

place in quick succession, during good weather, so we can secure everything and close up the north end of the building before winter winds pick up, or the skies open," he said.

The selection of the staging facility site was based on utility availability, drainage and adaptability of the site for future usage. The building will house not only the trainer, but can be used to perform modifications in preparation for its display in the new visitor center.

Although there will be no air-conditioning or climate control in the storage facility, McQuary says the plastic sheeting that will be used to cover Skylab should provide adequate protection during its temporary stay in Bldg. 413. "We'll be checking on it frequently," he said.

Skylab will be moved again, to much grander quarters, early in 1991, as Space Center Houston approaches its mid-year completion.

"We plan to suspend Skylab in a central position under the dome of the center's planned Starship Gallery," explained Public Services Branch Chief Chuck Biggs. "We'll finally have the space to show all the pieces assembled in the actual configuration flown in space. Visitors will be able to enter the vehicle from a covered mezzanine walkway," Biggs said.

After Skylab goes on display, Bldg. 413 will continue to be used as a staging facility, housing test articles and simulation components supporting program activities such as Space Station.